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ABSTRACT

The existence of a transfer effect between single-word decoding skill and contextual literal and inferential comprehension performance was investigated using sixth grade students classified as poor and very poor readers. Two training groups and a control group, each composed of 15 poor and 15 very poor readers, were used in the study. One group (content-specific training) received single-word decoding training that led to decoding mastery of all words to be read (four passages and comprehension questions, which were used by all groups). Another group (noncontent-specific training) learned to decode words, equal in difficulty and number of those of the content-specific group, but never a part of the vocabulary in the passages and questions. The control group read the four passages and answered the questions without decoding training. The results indicated that only the very poor content-specific readers significantly outperformed their noncontent-specific and control group counterparts. The findings suggest that a transfer effect does exist between single word decoding skill and contextual comprehension performance and that this effect is found in very poor readers who are basically word-by-word readers but who possess adequate auditory comprehension skills. (Author/FL)

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THE ROLE OF SINGLE-WORD DECODING SKILL ON LITERAL AND INFERENTIAL CONTEXTUAL COMPREHENSION PERFORMANCE

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The effects of single-word decoding practice on reading comprehension of poor readers has been studied in the classroom and laboratory by educational theorists, researchers and practitioners with equivocal results. Some (Otterman, 1955; Jackson and Dizney, 1963; Goodman, 1965; Tuinman and Brady, 1973; Duncan, 1974; D'abre, 1977; Hughes, 1977; Kowal, 1977; Allington, 1978; Fleisher, Jenkins and Pany, 1979) argue that with most readers, decoding training does little to guarantee any appreciable improvement in reading comprehension.

Others (Langer, 1965; Bleyer, 1970; Sherk and Liebert, 1978; Blanchard, 1980) maintain that certain forms of single-word decoding instruction with most readers can facilitate reading comprehension. Singer, Samuels and Spiroff (1974) and Ehri and Wilce (1980) seem to support this point. Ehri et al.(1980) suggests that cost-benefit considerations exist, both for introducing words in isolation and in context. Each offers unique advantages and disadvantages. Singer et al. (1974) seems to corroborate and finds that the best instructional practice is to provide both words in isolation and context training to facilitate comprehension. The question arises though, what about those disabled readers who have not yet learned to benefit from contextual cues and for whom decoding skills are a necessary first step to contextual awareness?

The present study investigated the feasibility of enhancing literal and inferential comprehension in disabled sixth graders through single-word decoding training before the readers encountered the words in context. The study was carried out under the following circumstances:

(1) atypical sixth grade readers (poor and very poor readers),

(2) single-word decoding training without a meaning emphasis,

(3) complete identification and pronunciation mastery of all the words the pupils read (both passages and questions),

(4) measurement of literal and inferential comprehension through multiple choice, four distractor questions,

(5) four, one to one (proctor and pupil) experimental sessions.

The major research questions were: (1) Will single-word decoding training leading to pronunciation mastery of words about to be read both in a passage and the accompanying comprehension questions, facilitate poor and very poor sixth grade readers' ability to answer literal and inferential comprehension questions about the passage? (2) Can a single-word decoding procedure that does not teach word meanings but instead brings about the correct pronunciation of words in isolation, be an effective instructional tool in facilitating or enhancing literal and inferential reading comprehension? The premise underlying the last question is that oral language can be an instructional link to print (Brown, 1958; Durkin, 1966, 1970; Mackworth, 1972). Over a decade ago, in a seminal investigation, Wiener and Cromer (1967) postulated a theoretical framework for empirically testing both research questions:

> Comprehension which refers to the addition of some form of meaning associated with identification . . . can occur and be examined at any point at which identification can occur, once the visual forms are transformed to auditory forms, there is a possibility of comprehension given the presence or appropriate language skills. (p. 638)

METHOD

Subjects

Ninety sixth grade pupils were randomly selected from a population of approximately 120 sixth grade disabled readers. The readers' total reading achievement grade placement levels on the California Achievement Tests (CAT) were at least 1.5 years behind chronological grade placement.

The Peabody Picture Vocabulary Test (PPVT) was administered as a covariate. All readers were ranked by IQ scores and then randomly divided into three groups by alternation: control, non-content-specific (NCS), content-specific (CS). The top fifteen readers in each group of thirty were designated poor readers and the bottom fifteen, very poor readers.

The mean PPVT IQ scores and CAT grade placement data for the poor reader groups were: 84 and 4.1 (control), 83 and 4.2 (NCS), and 84 and 4.2 (CS). For the very poor reader groups, the scores and data were: 68 and 2.6 (control), 70 and 2.9 (NCS) and 71 and 2.6 (CS).

Decoding Training

For the purposes of this study, single-word decoding training involved a proctor pronunciation and pupil echo procedure. CS pupils were asked to identify flash cards (1½" x 2½", primary type) representing words from the passage and questions they were about to read. If they correctly identified a word by pronouncing it within two seconds, the next flash card was presented. If the pupil did not pronounce a word correctly within two seconds, the proctor pronounced the word and asked the pupil to echo that pronunciation. The word was presented later, but never without some intervening single word instruction or rehearsal. If necessary, the word was presented several times. It should be emphasized that neither of the three groups received contextual help for a word in the form of a definition or an example of its usage in sentence or phrase context.

NCS pupils were asked to identify flash card words from passages equal to those of the CS group in readability (fifth grade) (Fry, 1968) and structure (third person narrative prose, approximately 120 words in

length) but never a part of the passages and questions they read as the comprehension criteria.

Control pupils received no training, they were merely given the passages (one at a time) to read and asked to answer the questions as best they could.

Comprehension Criteria

All pupils in the study read four passages from the McCall-Crabbs Standard Test Lessons in Reading, Booklet A. For each of the four passages there were ten author designed or adapted four-choice questions. Four questions measured inferential comprehension and six literal comprehension according to the following definitions: Literal comprehension - any question with the purpose of eliciting from the pupil a response which can be found explicitly stated in the written material, Inferential comprehension - any question with the purpose of eliciting from the pupil a response which is not explicitly stated in the written material. Pupils answered twenty-four literal and sixteen inferential questions for the study. Test-retest reliability coefficients for the four sets of passages and questions averaged .65 and content validity was determined by a validation panel of reading specialists and two pilot studies.

Procedure

CS pupils, each day for four days, were presented on a one-to-one basis, a deck of flash cards by a trained parent-volunteer proctor. The passages (which included the appropriate questions and flash card deck) were randomly assigned to the pupils daily. Each flash card deck represented all the words the pupils were about to read. There was a flash card deck for each passage and its questions. The average number of flash cards in each deck was 81. Each card in a deck was presented for

two seconds. If the word was identified and pronounced correctly, the next card was presented. If not, the proctor pronounced the word and the pupil echoed it. Pupils had to correctly identify and pronounce all words regardless of the number of presentations. To control for uniqueness of presentation on the unrecognized words, the minimum number of flash card words presented in a deck was ten. For example, if a pupil was unable to identify or pronounce five words on the first presentation of a flash card deck, on the next presentation the five words would be presented again but "shuffled" in with five known words and randomly presented. The pupils then read the passage and answered the comprehension questions (without the passage present).

NCS pupils followed the same procedures except the flash card words presented each day never appeared on any of the four passages and accompanying questions they read. In addition, since CS pupils could identify and pronounce all the words they might encounter, NCS as well as control pupils were allowed to ask the proctors to pronounce any word they had a question about, to hopefully reduce biasing the results in favor of the CS pupils. Each of the flash decks contained 81 words and the sources of the words in each deck were other McCall-Crabbs Standard Test Lessons in Reading, Booklet A passages and questions of fifth grade readability, which included words not present in the passages and questions the NCS pupils read for the study.

Statistical Analysis

Three, 2 X 3 (ANCOVA) factorial analyses of covariance (PPVT-covariate) were used. The dependent measure in one ANCOVA was the number of literal comprehension questions answered correctly, another used the number of inferential comprehension questions answered correctly

and a third used the total number of comprehension questions answered correctly. Independent variables for the designs were group membership (control, NCS, CS) and level of reading achievement on the CAT (poor and very poor). Computations were accomplished using The Statistical Package for the Social Sciences (Nie, 1975) system of computer programs. The specific programs were analysis of variance and covariance, sub-program ANOVA, and default option.

RESULTS

Literal Comprehension

According to the data, reading achievement level and group membership did not have a statistically significant affect on the number of literal comprehension questions answered correctly, nor was the interaction statistically significant (see Tables 1,2; Figure 1).

Inferential Comprehension

The data for inferential comprehension performance was somewhat different than that of literal comprehension performance. The main effects of reading achievement level and group membership, each had a statistically significant affect on inferential comprehension performance. A moderate to small effect of size (Cohen, 1969) was found for both independent variables (See Tables 1,2; Figure 1). The interaction was not statistically significant. Approximately eight percent of the variability in inferential comprehension performance can be explained as attributed to each of the independent variables. In addition, Duncan's New Multiple Range Test (Edwards, 1972) was used to determine the means between which significant differences existed on the group membership

variable. It was found that the CS group significantly ($p<.05$) out-performed both its counterparts. They ($\bar{x}$ = 15.72) differed significantly from the control ($\bar{x}$ = 13.95) and NCS ($\bar{x}$ = 12.25) readers. The test results also revealed that the NCS group differed significantly from the control readers.

Total Comprehension

Only the main effect of reading achievement level had a statistically significant affect on total reading comprehension performance. A moderate to small effect of size was found (see Table 1,2; Figure 1). As was the case with inferential comprehension performance, approximately eight percent of the variability in total reading comprehension performance can be explained as due to achievement level of the readers. The group membership X reading achievement level interaction was statistically significant. As can be seen in Table 3, reading achievement level and group membership interacted in an ordinal manner to affect total reading comprehension performance. Approximately eight percent of the variance in total comprehension achievement can be accounted for by knowing simultaneously a reader's reading achievement level and group membership. The Duncan's Test ($p < .05$) was used to determine whether the total comprehension performance mean differences under the two levels of reading achievement differed from each other for the three groups in the study. It was found that the CS and NCS groups did not differ significantly from the other groups but that the control groups differed significantly from the other groups. It is also important to note in Table 3 that the very poor readers in the CS ($\bar{x}$ = 20.60) and NCS ($\bar{x}$ = 17.95) groups out-performed their control ($\bar{x}$ = 16.10) counterparts; but, such was not the case with the poor readers. Control group poor

readers ($\bar{x}$ = 24.25) answered more comprehension questions correctly than did both the CS ($\bar{x}$ = 22.67) and NCS ($\bar{x}$ = 19.87) groups of poor readers.

DISCUSSION

The present study sought to determine if literal and inferential comprehension performance in sixth grade disabled readers could be enhanced by a procedure which ensured single-word decoding mastery of all the words to be read. As can be seen in Table 2 and Figure 1, it appears that literal comprehension amongst poor readers cannot be enhanced to any great degree but just the reverse is true with very poor readers. As a matter of fact, there was an increase in literal comprehension performance of approximately twelve percent in very poor readers. This represents approximately three more comprehension questions answered correctly by the CS group as opposed to the control group. Unfortunately, the inability of the procedure to change literal comprehension performance when it came to poor readers probably outweighed the gains made by the very poor readers when total reading comprehension data was analyzed. What is unexpected about literal comprehension data--is why the loss of the main effect for reading achievement? Did the CS very poor readers benefit from the procedure to point that their literal comprehension performance basically equalled that of the poor readers--despite the inherent differences in reading achievement levels? The answer, according to Table 2 seems to be yes. Interestingly enough, the NCS very poor readers ($\bar{x}$ = 12.07) seem to have profited from decoding training which was not even content specific when compared to the control group ($\bar{x}$ = 10.80).

Turning to a discussion of inferential comprehension performance,

the same pattern established with literal comprehension, exists. Poor readers did not benefit; very poor readers did (see Table 2 and Figure 1). The main effect for reading achievement level returned from its absence on literal comprehension performance. Poor readers ($\bar{x}$ = 7.97) out-performed very poor readers ($\bar{x}$ = 6.01). While this might signal that higher order comprehension processes are not quite so amenable to change through a decoding procedure: This is probably only true for poor readers since CS very poor readers did answer correctly approximately twelve percent more inferential comprehension questions than the control group. This represents approximately two more comprehension questions answered correctly. Thus, instructionally it can be anticipated that very poor readers will probably increase their inferential comprehension more through the study's procedures than poor readers.

The findings concerning total reading comprehension performance, as an amalgamation of literal and inferential comprehension, indicates that the main effect for reading achievement level is statistically significant. Despite the earlier concern over a lack of literal comprehension main effect; the inferential comprehension main affect was powerful enough to cause a significant overall comprehension main effect. This is to be expected since the variable itself (reading achievement level) served as a grouping criterion for the readers in the study. There was no main effect for group membership; but, the group membership X reading achievement level interaction was statistically significant. According to the interaction (see Tables 2,3 and Figure 1), control poor readers out-performed NCS and CS readers. It thus seems that for total comprehension performance in poor readers the procedure not only did not enhance or facilitate comprehension performance it might even hinder it.

On the other hand, for those readers who have reading achievement grade placement levels at least a year and one-half below the reading difficulty of the materials to be read (i.e., very poor readers in the study) the procedure seems to help literal and inferential comprehension performance. This seems the case for several reasons: (1) lack of a main effect for reading achievement levels on literal comprehension performance, (2) mean differences between control and CS very poor readers on literal comprehension performance, (3) a significant main effect for group membership on inferential comprehension, (4) mean differences between control and CS very poor readers on inferential comprehension, and (5) a significant interaction on total reading comprehension showing the CS very poor readers significantly out-performing control very poor readers.

In conclusion, it seems possible to experimentally enhance improved literal and inferential comprehension in very poor readers using only their oral and listening language backgrounds as "starting points." Since the study's single-word decoding training avoided a meaning emphasis it would seem that when very poor readers can correctly identify and pronounce a word familiar to their oral and listening language backgrounds they have at least one correct meaning in mind for that word. In addition, it would appear that very poor readers have more potential for improved literal and inferential comprehension than might be expected. In all probability their reading comprehension potential is seriously underestimated. This would seem the case since a relatively simple decoding procedure improved their reading comprehension. It should be remembered, though, that this simple procedure had two unique characteristics which might have contributed to its success: (1) complete decoding mastery of

all words to be read in both the passages and questions and (2) four individual experimental sessions for each reader.

Notwithstanding the optimism surrounding the procedure with very poor readers, it seems to pay no instructional dividends when it comes to enhancing comprehension in poor readers. Consequently, it seems possible to conclude that single-word decoding training does not enhance comprehension in all categories of disabled readers. The historical dichotomy between those who support and those who do not support the positive effects of single-word decoding training might take a step towards resolution if methodological considerations are given to the differences between the reading achievement levels of the students and the reading difficulty of the materials to be read, complete decoding mastery of both passages and questions and more than one experimental session.

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Table 1 SUMMARY TABLE CONTAINING THE RESULTS OF THREE SEPARATE 2 X 3 ANALYSES OF COVARIANCE

	LITERAL COMPREHENSION					INFERENTIAL COMPREHENSION					TOTAL COMPREHENSION				
SOURCE	df	MS	F	p	eta	df	MS	F	p	eta	df	MS	F	p	eta
Group	2	7.61	.57	N.S.	--	2	21.79	4.01	.021	.30	2	55.15	2.01	.141	--
RdgLev	1	45.23	3.37	N.S.	--	1	41.40	7.62	.007	.29	1	173.18	6.30	.014	.26
GrpxRdg Lev	2	36.53	2.72	N.S.	--	2	16.49	3.04	N.S.	--	2	93.43	3.40	.038	.28
Within	83	13.43	--	--	--	83	5.43	--	--	--	83	27.47	--	--	--

Table 2 ADJUSTED MEANS FOR THREE SEPARATE 2 X 3 ANALYSES OF COVARIANCE

LITERAL COMPREHENSION*

RDG LEV	CONTROL	NCS	CS
Poor Readers	15.50	13.40	13.95
Very Poor Readers	10.80	12.07	13.57

*24 possible correct

INFERENTIAL COMPREHENSION*

RDG LEV	CONTROL	NCS	CS
Poor Readers	8.74	6.45	8.72
Very Poor Readers	5.21	5.80	7.00

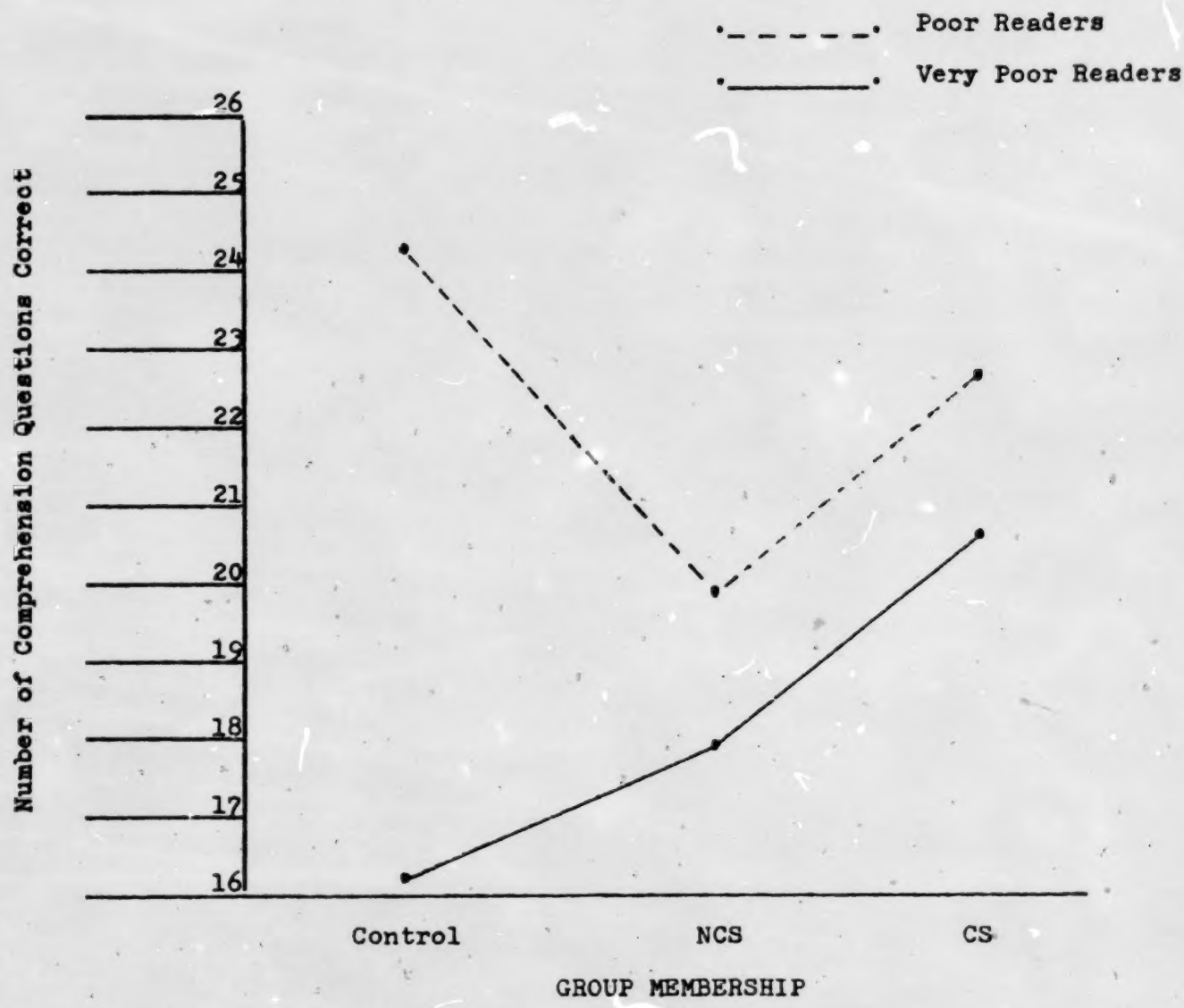
*16 possible correct

TOTAL COMPREHENSION*

RDG LEV	CONTROL	NCS	CS
Poor Readers	24.25	19.87	22.67
Very Poor Readers	16.10	17.95	20.60

*40 possible correct

Table 3 GRAPH OF A FIRST-ORDER INTERACTION--TOTAL READING COMPREHENSION SCORES



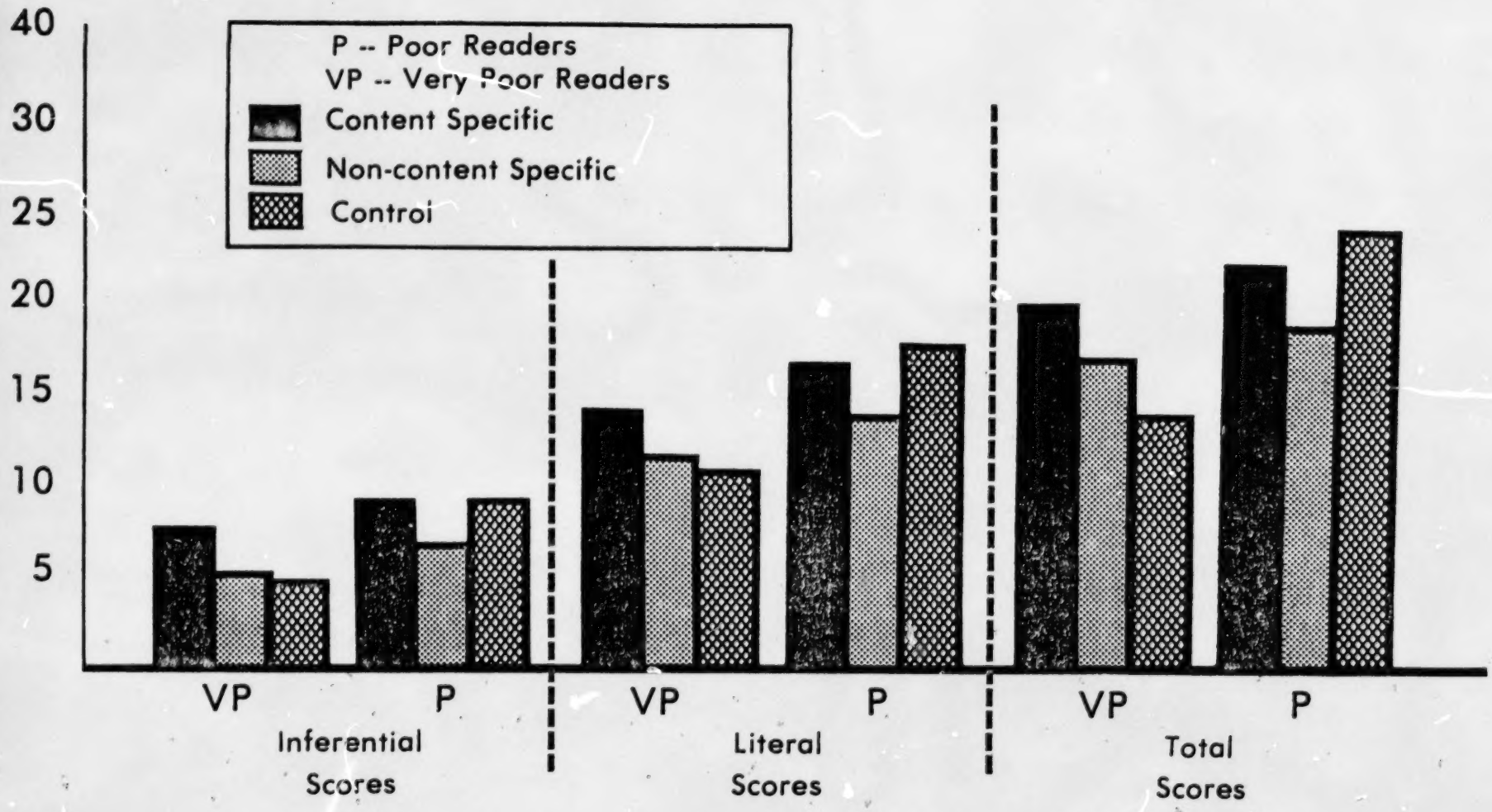


Figure 1. Raw Score Means for Comprehension Scores with Adjustments for Verbal IQ Scores